3/PRTS
10/520691
DT15 Rec'd PCT/PTO 07 JAN 2005
PCT/CN03/00300

A Method of Realizing Communicating between Modules of System Devices

Field of the Technology

The invention relates to the internal communication within devices, especially a method of realizing communicating between modules of system devices.

Background of the Invention

In larger devices, such as transmission facilities, exchange devices and wireless base stations etc., the modules have direct or indirect connection, so it is necessary to communicate between the modules frequently. The communication information includes not only those for normal service, but also those for maintenance, such as alarm, fault detection etc.

At present, there are two ways for communication between modules in devices:

The first way is to communicate through a mailbox, as shown in figure 1. The control module 101 is connected with every module 102 through the data bus, address bus and control bus, and because the mailbox can bi-directional communicate, the control module 101 can make communication with every module 102.

The second way is shown in figure 2. The control module 201 is connected with every module 202 through the 485 buses, and the communication can be implemented through the 485 buses between the module 201 and every module 202, or between different modules of 202.

Although the bus mode of the above two ways has a simple structure that is easy to implement, and supports various protocols, but there are several disadvantages as follow: the load capacity of a bus is limited, so it does not support communication of many modules; if a fault happens at a point, it is easier that the whole bus cannot communicate or the communication reliability become worse, and also it is difficult to locate the fault point; furthermore, since there are many connection lines, the back-plane circuit design and layout are complex.

Summary of the Invention

In view of the above-mentioned facts, objective of the invention is to provide a method of realizing communicating between modules of system devices in order that a large amount of modules can reliably communicate with each other and a fault is easy to be located.

To archive the above objective, technical scheme of the invention is as follow:

A method of realizing communicating between modules of system devices, wherein:

Setting a centralized exchanging and controlling unit in device;

Connecting the centralized exchanging and controlling unit with every module through its own communication control interface in the device;

When communicating between the modules, sending the message to the centralized exchanging and controlling unit by a source module, processing the message by the centralized exchanging and controlling unit, and forwarding the processed message to a destination module by the centralized exchanging and controlling unit.

The method further comprising:

Broadcasting the message by the centralized exchanging and controlling unit, comparing the destination address of the message with its own address by each module in device, and if the two addresses are identical, receiving the message by the module.

The method further comprising:

Presetting address pins of each module, and getting its own address by reading the current state of address pins by each module.

The method further comprising:

Presetting the state of address pins in each module by setting the voltage state on the backplane circuit.

Wherein:

Sending the message from a source module to a destination module directly through exchanging by the centralized exchanging and controlling unit.

In the invention, every module is directly connected with the centralized exchanging and controlling unit with high-speed communication control interfaces, so

comparing with the present technique, the invention can implement any two modules communication, achieve high reliability, locate a fault point easily, also, because of the invention, the number of the modules that take part in the communication is unlimited, the system design is simple, easier and flexible.

Brief Description of the Drawings

Figure 1 shows a structure diagram of one way that implements communication between the modules with the present technique.

Figure 2 shows a structure diagram of another way that implements communication between the modules with the present technique.

Figure 3 shows the system structure diagram of the invention.

Figure 4 shows an implementation structure diagram of the invention.

Figure 5 shows principle diagram of an embodiment in the invention.

Figure 6 shows principle diagram of another embodiment in the invention.

Embodiments of the Invention

The invention will be described in more detail with reference to drawings and embodiments.

Figure 3 shows a system structure diagram of the invention. In this diagram, modules 1 to N are modules 301 that need to communicate with each other within the device, and every module is connected with the centralized exchanging and controlling unit 302, respectively. During communication, a message is transmitted from a source module of the modules 301 to the centralized exchanging and controlling unit 302, the centralized exchanging and controlling unit 302 processes the message and then forwards the processed message to the destination module in the modules 301. Said message includes not only service message, but also maintenance message, such as alarm and fault detection messages etc.

Figure 4 shows an implementation diagram of the invention. In this diagram, there are the modules 301, the centralized exchanging and controlling unit 302 and the communication control interfaces 401 that are individually located on each module 301 and the centralized exchanging and controlling unit 302. Each module 301 takes its interface 401 to connect with the centralized exchanging and controlling unit 302, and communicates each other through the centralized exchanging and controlling unit 302. Taking the communication between modules 1 and 3 as an example, the specific communication procedure is as follows: through the interface 401, the module 1 transmits a message with the module 3 address to the centralized exchanging and controlling unit 302; the centralized exchanging and controlling unit 302 receives the message through the interface 401; after processing, the centralized exchanging and controlling unit 302 forwards the message to the destination module 3.

In fact, the invention takes the thought of forming net in a local area network to the internal communication of device, and the centralized exchanging and controlling unit servers as the central network unit, other modules communicate each other through the centralized exchanging and controlling unit, therefore, the centralized exchanging and controlling unit may take the HUB structure or SWITCH structure to perform its functionalities.

When applying a HUB as the centralized exchanging and controlling unit, the connection between the HUB and the modules is the same as the connection shown in figure 4, the only difference is that the HUB substitutes the centralized exchanging and controlling unit 302 and the 10M or 100M Ethernet interface substitutes the interface 401; figure 5 shows the detail implement procedure. In figure 5, the Ethernet interface 501, which is leaded from every module 301 that need to communicate, is connected to the HUB 502 through the backplane circuit; and the HUB 502 comprises: the transformer 503, the physical layer 504 and the message regenerating and broadcasting unit 505. Taking communication between the module 1 and the module 3 as an example which 10M Ethernet interface 501 is applied, the communication procedure is as follows: the module 1 sends a message with the module 3 address to the HUB 502 through 10M Ethernet interface 501; in the HUB 502, the message passes the transformer 503, which makes isolation and impedance transformation, and the physical layer 504, which implements the carrier interception, code conversion

and collision detect; and then the message enters the regenerating and broadcasting unit 505 that makes message amplification, shaping; and then the message is sent to every module 301 through the physical layer 504, the transformer 503 and the Ethernet interface 501. When the message is coming, every module 301 compares the destination address in the message and its address; if the two addresses are different, the message is rejected; when the message is coming to the module 3, and the two addresses are identical as a result of the comparing, the module 3 receives the message. The communication between other modules 301 in device is also as described above. In the above communication procedure, each module 301 needs to know its address because the HUB 502 cannot implement the function of recognizing address and storing so as to implement the communication with the modules 301 in the manner of broadcasting; in this embodiment, it is implemented by setting state on the address pins of a module with backplane circuit to preset each module address uniquely, every module gets its address from the current state on the address pins, wherein every module has its unique address pins.

In order to transmit easily and support the communication between more modules, a SWITCH structure severs as the centralized exchanging and controlling unit in figure 4. The connection between the SWITCH and the modules is the same as the connection shown in figure 4, the only difference is that the SWITCH substitutes the centralized exchanging and controlling unit 302 and the Ethernet interface 501 substitutes the interface 401; figure 6 shows the implement procedure. In figure 6, every module 301 is connected with the SWITCH 601 through the Ethernet interface 501, and the SWITCH 601 is a two layers exchange that includes: the transformer 602, the physical layer 603, the exchange part 604 and the Synchronous Dynamic RAM (SDRAM) 605. The transformer 602 and the physical layer 603 have the same functions as the transformer 503 and the physical layer 504 in the figure 5. The exchange part 604 mainly performs the address self-learning function and the packet exchange function, and the SDRAM 605 stores an address table and the packets. Suppose the embodiment takes a 10M Ethernet interface 501, and when taking communication between the module 1 and the module 3 as an example, the communication procedure is as follows: a message with module 3 address is sent from the module 1; the message passes the 10M Ethernet interface 501, the transformer 602, the physical layer 603 and enters the exchange part 604 in which the message is

packed and exchanged, and then the packet and the address table are stored in the SDRAM 605; after that it is waiting for an idle output line; once there is an idle line, the message packet is sent out by the SDRAM 605 along the path: the exchange part 604, the physical layer 603, the transformer 602 and the Ethernet interface 501. What difference with the HUB 502 is that the SWITCH 601 can process messages of multiple modules 301 simultaneously and has self-learning ability: once the message is processed by the SWITCH 601, the exchange part 604 will store the address of the processed message in the SDRAM 605 automatically. Therefore, when the module 301 is a destination module of a message for the first time, the exchange part 604 of the SWITCH 601 store the address of the destination module, when processing later, according to the address table stored in the SDRAM 605, the message can be sent to the corresponding destination module directly by the SWITCH 601. When a module is a destination module of a message for the first time, the SWITCH 601 broadcasts the message to all modules 301 to find out which one matches the destination module in the message, and the procedure is same as those in the embodiment of the figure 5.

The advantages of using SWITCH are that the SWITCH has better utility of bandwidth and supports multiple modules communication simultaneously, and the advantages of using HUB are low cost, simple and reliable.

All mentions above are some better embodiments, and they do not limit the protection scope of the invention.